

We claim:

1. A process for oxidizing a starting material with an oxidizing  
5 agent to obtain a product,  
  
which comprises  
  
carrying out the oxidation in a reaction apparatus which has  
10 a bottom region at the lower end,  
a top region at the upper end and  
a reaction zone between the top region and the bottom region,  
  
maintaining the reaction mixture in the boiling state in the  
15 reaction zone,  
  
and  
  
introducing oxidizing agent into the reaction zone in at  
20 least two substreams.
2. A process as claimed in claim 1, wherein the unconverted  
starting material leaving the reaction zone is recycled into  
the reaction zone.
- 25 3. A process as claimed in claim 1 or 2, wherein the starting  
material used is a linear or cyclic alkane.
4. A process as claimed in claims 1 to 3, wherein the oxidizing  
30 agent used is an oxidizing agent which is gaseous under the  
reaction conditions.
5. A process as claimed in claim 4, wherein the oxidizing agent  
used is a molecular oxygen-containing gas.
- 35 6. A process as claimed in claims 1 to 5, wherein the oxidation  
is carried out in the presence of a catalyst.
7. A process as claimed in claims 1 to 6, wherein water is  
40 by-produced in the oxidation and this water is withdrawn  
during the oxidation from the reaction apparatus in the  
reaction zone or in the top region.
8. A process as claimed in claims 1 to 7, which is carried out  
45 at a temperature in the range from 10 to 300°C, measured in  
the reaction zone.

## 14

9. A process as claimed in claims 1 to 8, wherein the reaction apparatus used is a rectification column.
10. A process as claimed in claims 1 to 9, wherein the starting material is oxidized with cycle gas which is enriched with an oxidizing agent.
11. A process as claimed in claims 1 to 10, wherein a product-containing reaction mixture is withdrawn below the reaction zone.
12. A process as claimed in claims 1 to 11, wherein the higher-boiling reactant selected from the group consisting of oxidizing agent and starting material is fed to the reaction apparatus above the lower-boiling reactant selected from the group consisting of oxidizing agent and starting material.
13. A process as claimed in claims 1 to 12, wherein the starting material used is cyclohexane.
14. A process as claimed in claims 1 to 13, wherein cyclohexane is oxidized with air, reaction mixture is continuously withdrawn in the bottom region of the reaction apparatus and unconverted cyclohexane and water are continuously removed in the top region, cyclohexane and water are separated by means of a phase separator and the resulting cyclohexane is fed to the top region of the reaction apparatus as reflux.